England's frank and sturdy bearing,
Scotland's judgment, true and tried,
Erin's energetic daring,
And the Welchman's honest pride,—
Send these forth, and tame the savage,
Sow his realm with British homes,
Where till now wild monsters ravage,
Or the wilder Bushman roams!

Let, as erst in Magna Græcia,
Nobles, sages, join the ranks;
And for vacant Austral-Asia
Leave for good these swarming banks;
Not as Exiled,—but with honour!
Told in tale, and sung in song,—
With the Queen,—God's blessing on her!
Speeding this good work along!

* * * *

Haste, then, all ye better natures,
Help in what must bless the World!
See, those cellar-crowded creatures
To despair's own dungeon hurl'd,—
Send—or lead them o'er the waters
To the genial shores, that give
Britain's sacred sons and daughters
Man's great privilege—to Live.

There,—for grudged and scanty wages,
Grinding rent and parish tax,—
In the wood, unheard for ages,
Rings the cheerful freeman's axe;
Whilst in yonder cozy clearing,
Home, sweet Home, rejoices life,
Full of thoughts and things endearing,
Merry babes and rosy wife!

There,—instead of festering alleys,
Noisome dirt, and gnawing dearth,—
Sunny hills and smiling valleys
Wait to yield the wealth of Earth!
All She asks is—human labour,
Healthy in the open air;
All She gives is—every neighbour
Wealthy, hale, and happy There!*

With *energy* and determination much may be done, let a man's position be what it may; without these, nothing. The possession or want of energy makes much of the difference between the weak and the powerful. Let some of our friends think over this: have a fixed purpose, and pursue it steadily.

And to those of our readers who have the direction of extensive works, to the Government especially, and important corporations, we would say with great earnestness, Pause before you determine on discontinuing operations: if money must be saved, save it in other quarters, but do not add to the enormous amount of distress already existing, by discharging workmen.

If what we have here written prove of little value, it has, at least, a good intention and a pure purpose, which must serve as our excuse.

GEORGE GODWIN.

ON THE VARIOUS QUALITIES OF CAEN STONE.†

IT seems to be the general opinion of the proprietors of quarries and their quarrymen, as well as of the masons and builders at Caen, that the most durable stone is obtained from the uppermost of the six workable beds, or from those beds which are nearest to the top, and freest from the little pebbly concretions which abound in the ceiling bed; and also that the lowest beds are softer, and thereby more readily disintegrated by exposure to the weather. I feel disposed to pay attention to this statement, because it corresponds with practical observations and opinions entertained by most people who are well acquainted with quarrying and working stone of a similar mineralogical character in our own country. The top beds of Portland, Bath, Ketton, and other oolitic limestones, are all the most durable; whereas the undermost strata in the same quarries are well known to moulder away, if exposed to moisture and the usual atmospheric influences.

It is with all the varieties of Caen stone as with most other stones, that the goodness or power to resist decay depends chiefly upon the quantity and quality of the cementing substance by which the component grains adhere to each other. The cement that unites the grains, the ova, or other loose particles, into a mass, is formed of the same elements as the grains themselves, but more crystalline; it is, in fact, the decomposition of some of the superincumbent mass, saturating and crystallizing throughout the beds beneath. Water, even in its simplest state, may be considered to act as a solvent to most things; but when it contains acid, its power of dissolving calcareous substances is considerably augmented. Many waters are impregnated with carbonic acid, obtained partly from the atmosphere and frequently from subterranean sources. If they contain a superabundance of carbonic acid, they will rapidly decompose limestone, and carry the atoms thus sustained in solution until a certain quantity of the acid, in a gaseous state, has evaporated, when the atoms of limestone will again solidify in crystals, and perhaps assume a totally different character. If this ingenious process of nature be carried on for a great length of time, over a considerable thickness of loose calcareous matter, the probability is, that the water thus charged with lime and carbonic acid will saturate the more porous parts, and thus ultimately form a well-cemented and compact limestone, of what was originally a congeries of loose ova, or grains.

Under these, or similar circumstances, it is but reasonable to suppose that in the deep recesses of the earth, where the extreme changes of surface-temperature, and vegetation, and the influences which produce organization and life, cease to act,—there, even there, a creative power still pursues its never-ending task of giving new forms to matter, and that, the longer a slightly-connected or porous limestone remains buried beneath a certain quantity of calcareous material, the more solid and indurated it will become. And if this stone be ultimately extracted, and used for ornamental architecture, it will be more durable than that which is of recent formation.

Exactly the converse of this process takes place after a stone is removed from its natural position in the quarry, and exposed to the numerous vicissitudes of climate, temperature, moisture, and other atmospheric changes which are constantly in operation. From the moment of its removal, destruction commences, and continues incessantly. In some instances, the action is far more rapid than in others; but whether the ruin be effected in ten years, or ten thousand, is only a question of time,—the same influence is for ever at work to bring about the disintegration, decay, and final dissolution of all things.

Of all the causes of decay in stone, none is more destructive than variations of temperature: the vicissitudes of heat and cold, dryness and moisture, frequently alternating, are more ruinous to the carved parts of a building than either of these extremes constantly operating. However slight the additional heat may be to which a body is subjected, it will expand under its influence, and contract when the temperature is lowered. The thermometer will probably vary 100 degrees from the severe frost of a winter night to the direct rays of an afternoon summer sun, which never shines upon the north or north east sides of a building, except very obliquely at rising and setting; but the south and west fronts have the same degree of cold as the north and east during the night, with the additional warmth of meridian splendour daily. Such extremes must tend to loosen the component parts, and thereby separate many small fragments from the surface of stones, especially if the mass is made up of different substances, in which case some will expand and contract more, in proportion to their size and density, than others. The test of time proves this to be correct, for in all cases the greatest amount of disintegration has taken place, where the inequalities of temperature are greatest.

It is pretty evident, from both theory and practice, that there is a considerable difference between the upper and lower beds. The next question is, did the architects and builders of the numerous old edifices in Caen and its neighbourhood generally, use only the top beds in the construction of their elaborate architectural works; or did they frequently, if not on all occasions, apply the stone from one particular quarry or district, to the exterior of their buildings; and a softer, or more expeditiously working material to the interior, in situations protected from the weather.

If we examine the granulated texture of a fresh-broken fracture, from an old building, appearances are certainly in favour of the stone having been procured from some of the uppermost beds; or more probably, from a totally different quarry, for the stone is much harder, and of a lighter colour, than is to be found in any of the Allemagne quarries. But as there is no very evident distinction, no fossils or organic remains, peculiar to one bed more than another, no certain conclusion can be arrived at, from the most attentive examination in this manner. After the lapse of several centuries, the only mode of procedure is to draw an inference from circumstantial evidence.

The road which passes along the entrances to most of the quarries (about 35 in number), is on a level above the lower beds, or in other words, the road is formed upon those beds which are considered unfit for external works; consequently, whenever any of these subterranean quarries were opened or began to be worked, the stone first procured from them must have been taken from those beds which are now considered to be most durable; and as there is a regular descent, of a very slight inclination, from the road to the interior, nearly approaching to the extreme end of the quarries, it is quite certain that an enormous quantity of stone, of the best quality to be obtained in that particular district, must have been extracted, probably during several centuries, before they got far enough in, and deep enough down, to make use of the lower beds.

In all countries, during feudal times, the hills or protuberances were generally occupied by the barons, either for the beauty of the prospect, or more probably on account of their commanding situation: thus, we find the castle at Caen, originally a fortress of considerable strength, surrounded by strong, lofty walls, and elevated on a rock considerably higher than any other ground in the neighbourhood. The inspection of these fortifications, and the rock on which they are built, leads us to presume that the same stone which had been removed to form a moat was applied to construct the wall,—thus answering two purposes, and thereby rendering the approach of a hostile party more difficult. Buildings for protection against an enemy, generally precede those in the service of religion; and by finding a superabundance of stone, in constructing a fort upon the crown of a rock, they would naturally be induced to open a quarry, close at hand, to supply materials for the erection of churches and other public edifices,—and accordingly we find the remains of many extensive quarries in different places near the ancient castle.

If we observe the distance of the Allemagne quarries, and the proximity of those by the castle, to many of the old buildings, including the churches of St. Etienne and the Holy Trinity; it will require no great stretch of imagination to suppose that the architects or builders of these venerable structures availed themselves of good materials within a short distance, in preference to fetching stone of a doubtful quality from three or four times the distance; and this opinion is strengthened by carefully examining specimens taken from the exterior of some of the celebrated churches at Caen. According to tradition in the neighbourhood, no stone has been extracted from these ancient quarries for several hundred years: it is supposed they were deserted soon after those at Allemagne were discovered and became in more general use,—perhaps from fear of the town being endangered by undermining, or because the more recent quarries were found to produce a softer and more easily-working material.

Between the beds of Caen stone, we sometimes find a thin stratum of highly ferruginous loam, especially between the lower beds; and this clayey oxide of iron may be traced, to a slight extent, throughout the stone of all the beds, particularly in that of the Franc Banc, giving to it a deeper colour, somewhat of a rusty tint: this circumstance may very likely be one of the causes why that bed is more perishable than the upper ones.

It is quite surprising to notice the great difference of hardness in the same specimen of Caen stone when thoroughly saturated with

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* We are indebted for these lines to Mr. Martin Tupper, the author of "Proverbial Philosophy," whose pen has before this enriched our pages.

† See page 26 *ante*.